CLAIMS

1. A pulse management system configured to perform a plurality of pulse measurements on each of a plurality of pulses of an acquired signal, and to store results of said plurality of pulse measurements in an accessible data structure with substantially no operator involvement.

2. The pulse management system of claim 1, wherein said acquired signal is acquired by a digital oscilloscope and wherein said pulse management system is implemented in said digital oscilloscope to perform said plurality of pulse measurements on said plurality of acquired signal pulses.

3. A pulse database generator for use in a signal measurement system, said pulse database generator constructed and arranged to process acquisition data of an acquired signal in accordance with measurement parameters to generate pulse characteristic data for storage in a pulse data structure, said pulse characteristic data comprising results of a plurality of pulse measurements applied to a plurality of pulses of said acquired signal.

4. The pulse database generator of claim 3, wherein said pulse database generator comprises:

a histogrammer that samples the acquisition data to generate at least one histogram, said histogram comprising a distribution of number of occurrences that said acquired signal attained each of a plurality of signal levels over a certain time range; and

a mode finder that identifies one or more modes of said histogram representing one or more signal levels that occur most frequently in said histogram, each of said one or more modes representing a signal level having a logical interpretation.

5. The pulse database generator of claim 4, wherein said pulse database generator further comprises:

a transition calculator that determines a transition signal level at each of one or more transition percentages, wherein each of said one or more transition percentages is a percentage of a difference between two of said signal levels having a logical interpretation.

6. The pulse database generator of claim 5, wherein said pulse database generator further comprises:

a data analyzer that processes said acquisition data to determine transition times at which each pulse attains each of said transition signal levels.

7. The pulse database generator of claim 6, wherein said pulse database generator further comprises:

a pulse measurement engine that performs said plurality of pulse measurements on said each said plurality of pulses utilizing said transition times and said pulse type indication.

8. The pulse database generator of claim 6, wherein said plurality of pulse measurements are predetermined.

9. The pulse database generator of claim 6, wherein said pulse characteristic data further comprises:

results of statistical analyses performed on said pulse measurement results

10. The pulse database generator of claim 6, wherein said measurement parameters are provided by the operator.

11. The pulse database generator of claim 3, wherein said pulse database generator further comprises:

a transition calculator that determines the signal level at each specified transition percentage based on one or more signal levels for each logical state of the pulse in the acquired signal including at least a top signal level and base signal level, wherein said one or more signal levels are provided by the operator.

12. The pulse database generator of claim 4, wherein said histogram comprises a table stored in memory that lists the quantity of sampled occurrences said acquired signal attained each of a plurality of signal level value over a certain time range.

13. The pulse database generator of claim 12, wherein said acquired signal is a voltage signal, and wherein said signal levels represented in said histogram are voltage levels.

14. The pulse database generator of claim 4, wherein an acquisition memory stores acquisition data pertaining to a plurality of acquired signals, and wherein said measurement parameters includes a source indication that indicates which of said plurality of acquired signals is to be processed by said histogrammer.

15. The pulse database generator of claim 4, wherein said acquired signal comprises two signal levels having a logical interpretation, and wherein said histogram is nominally a bimodal signal level distribution.

16. The pulse database generator of claim 4, wherein said measurement parameters includes an indication of the number of signal levels of said acquired signal have a logical representation, wherein said mode finder utilizes said indication to identify a corresponding number of modes of said histogram.

17. The pulse database generator of claim 4, wherein said acquired signal is an alternate mark inversion communication signal that transitions between three signal values, and wherein said mode finder identifies three modes in said histogram.

18. The pulse database generator of claim 4, wherein said mode finder implements a smoothing function to identify any of said one or more modes of said histogram that is not well defined.

19. The pulse database generator of claim 5, wherein said signal levels having a logical interpretation include a top signal level and a base signal level, and wherein said transition calculator determines transition signal levels achieved by each pulse at said transition percentages of the signal transitions between said top and base signal levels.

20. The pulse database generator of claim 19, wherein said transitional percentages comprise 10%, 50% and 90% of the difference between said top signal level and said base signal level.

21. The pulse database generator of claim 19, wherein said transition percentages are provided by the operator through a user interface.

22. The pulse database generator of claim 3, wherein said pulse database generator comprises:

a transition calculator that determines the signal level at each specified transition percentage based on one or more signal levels for each logical state of the pulse in the acquired signal including at least a top signal level and base signal level, wherein said one or more signal levels are provided by the operator.

23. The pulse database generator of claim 7, wherein said pulse measurements comprise one or more of the group consisting of rise time; fall time; pulse width; preshoot; pulse area; minimum voltage; maximum voltage; average voltage; volts AC RMS; volts DC RMS; amplitude voltage; base voltage; top voltage; upper voltage; middle voltage; lower voltage; plus width; minus width; positive duty cycle; negative duty cycle; period; phase; frequency; delta time; peak-to-peak voltage; and overshoot.

24. The data structure of claim 3, wherein said signal measurement system is a digital oscilloscope.

25. A signal measurement system for analyzing pulses of an acquired signal represented by acquisition data stored in a memory device of the signal measurement system, comprising:

a computing device having a memory;

a computer-readable medium of instructions that, when executed by said computing device, processes said acquisition data in accordance with measurement parameters to generate pulse characteristic data for storage in a pulse data structure in said memory, said pulse characteristic data comprising results of a plurality of pulse measurements applied to pulses of said acquired signal.

26. The signal measurement system of claim 25, wherein said computer-readable medium of instructions comprises:

means for generating at least one histogram of said acquired signal; and

means for identifying one or more modes of said histogram.

27. The signal measurement system of claim 26, wherein said computer-readable medium of instructions further comprises:

means for determining a transition signal level at each of one or more transition percentages, wherein each of said one or more transition percentages is a percentage of a difference between two of said signal levels having a logical interpretation.

28. The signal measurement system of claim 27, wherein said computer-readable medium of instructions further comprises:

means for determining transition times at which each pulse attains each of said transition signal levels.

29. The signal measurement system of claim 28, wherein said computer-readable medium of instructions further comprises:

means for performing said plurality of pulse measurements on each of said plurality of pulses utilizing said transition times and said pulse type indication.

30. A memory apparatus for storing a data structure accessible by a software program executed on a data processing system, the memory apparatus operationally coupled to a signal measurement system, said data structure comprising:

a plurality of signal pulse characteristics data units containing information regarding each pulse of an acquired signal stored in an acquisition memory of the signal measurement system; wherein said signal pulse characteristics data units include,

a pulse identifier data unit uniquely identifying each said pulse of said acquired signal, and

a plurality of pulse measurement results data units associated with each said pulse identifier.

31. The data structure of claim 30, wherein said signal pulse characteristics further comprise:

a time of occurrence data unit associated with each pulse identifier data unit in said data structure, said time of occurrence data unit indicating a time said associated pulse occurred relative to a time at which a trigger event causing said storage of said acquired signal occurred.

32. The data structure of claim 31, wherein said data structure further comprises:

global measurement statistics data units for one or more of said plurality of pulse measurements, wherein said global statistics are associated with said acquired signal in said data structure.

33. The data structure of claim 30, wherein said pulse identifier data unit is a value indicating a relative occurrence of said associated pulse relative to other pulses of said acquired signal.

34. The data structure of claim 32,

wherein said acquired signal is one of a plurality of acquired signals, the acquisition data for each of which is stored in an acquisition memory,

wherein said pulse data array includes said pulse characteristics data units and said global measurement statistics data units for a plurality of acquired signals,

wherein each such pulse characteristics data units and global measurement statistics data units are associated with said unique identifier of said acquisition.

35. The data structure of claim 30, wherein said data structure has a data format suitable for the implementing application.

36. The data structure of claim 31, wherein said pulse characteristics further comprise:

a pulse type data unit associated with each of said plurality of pulse identifier data units, said pulse type data unit indicting whether said corresponding signal pulse is a positive or negative pulse.

37. The data structure of claim 32, wherein each of said plurality of pulse measurement results data unit associated with each of said plurality of pulse identifier data units in said data structure comprise one or more of the group consisting of:

rise time measurement results;
fall time measurement results;
pulse width measurement results;
preshoot measurement results;
pulse area measurement results;
minimum voltage measurement results;
maximum voltage measurement results;
average voltage measurement results;
volts AC RMS measurement results;
volts DC RMS measurement results;
amplitude voltage measurement results;
base voltage measurement results;
top voltage measurement results;
upper voltage measurement results;
middle voltage measurement results;
lower voltage measurement results;
plus width measurement results;
minus width measurement results;
positive duty cycle measurement results;
negative duty cycle measurement results;
period measurement results;
phase measurement results;
frequency measurement results;
delta time measurement results;
peak-to-peak voltage measurement results; and
overshoot measurement results.

38. The data structure of claim 30, wherein said plurality of pulse identifier data units and said associated pulse characteristic data units are arranged in said data structure in a same sequence as said corresponding signal pulses occur.

39. The data structure of claim 30, wherein said pulse characteristic data units and said pulse identifier data units are stored in said pulse data structure automatically and with no operator involvement.

40. The data structure of claim 30, wherein said data structure is populated automatically and in accordance with measurement parameters.

41. The data structure of claim 40, wherein said measurement parameters are provided at least in part by the operator through a user interface operatively coupled to the signal measurement system.

42. The data structure of claim 30, wherein said data structure is generated and populated by said pulse characteristics in response to an acquisition memory storing said acquired signal.

43. The data structure of claim 30, wherein said signal measurement system is a digital oscilloscope.

44. A method for generating a pulse data structure for storage in a memory apparatus operationally coupled to a signal measurement system, said data structure comprising a plurality of signal pulse characteristics of a subset of pulses of an acquired signal stored as acquisition data in an acquisition memory of the signal measurement system, the method comprising the steps of:

1) performing a plurality of pulse measurements on each said pulse of said acquired signal utilizing one or more transition times, said acquisition data, and a pulse train type indicator; and

2) storing results of said plurality of pulse measurements in the pulse data structure such that said results are associated with a unique identifier of each said pulse of said acquired signal.

45. The method of claim 44, further comprising the steps of:

3) receiving, before said step 1), an indication of the type of pulse train embodied in the acquisition signal;

4) determining, before said step 1), transition signal levels at one or more transition percentages between a top signal level and a base signal level; and

5) determining, before said step 1), transition times each said pulse of said acquired signal attains each of said transition signal levels.

46. The method of claim 45, wherein said step 4) comprises the steps of:

a) receiving one or more transition percentages;

b) generating at least one histogram of said acquisition data;

c) determining top, base and other voltage levels based on modes of said histogram and said pulse train type; and

d) calculating transition voltages at each of said transition percentages relative to the top and base voltages for said pulse train type.

47. The method of claim 45, wherein said step 4) comprises the steps of:

a) receiving one or more transition percentages;

b) receiving global top and base voltages; and

c) calculating transition voltages at each of said transition percentages relative to the top and base voltages for said pulse train type.

48. The method of claim 45, wherein said step 4) comprises the step of:

a) receiving global transition signal levels at said one or more transition percentages between said top signal level and said base signal level.

49. The method of claim 44, wherein said signal measurement system includes a plurality of channels or an acquisition memory sufficiently large to store data captured during more than one acquisition, and wherein the method further comprises the step of:

1) receiving an indication of which of said plurality of channels is to be a source of said acquisition data.

50. The method of claim 49, wherein said subset of pulses comprises all or less of the pulses chosen for analysis by the operator.

51. The method of claim 45, wherein said pulse train type is provided by the operator.